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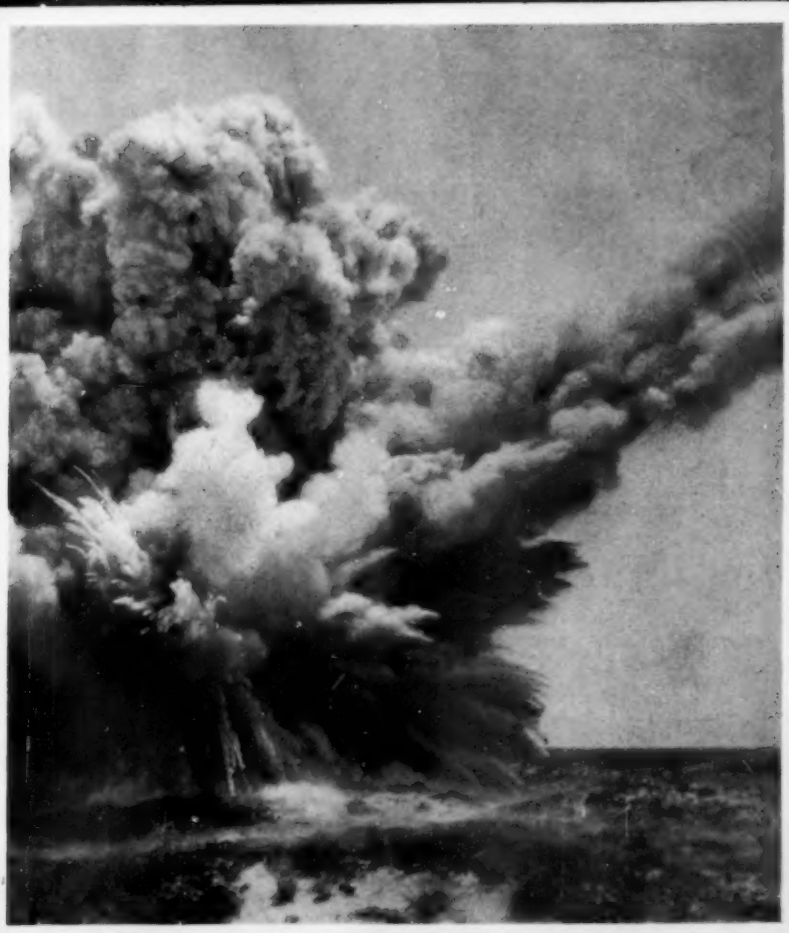
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



MARCH 19, 1932

By Earthquake to El Dorado

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A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

VOL. XXI *No. 571*

The Weekly Summary of Current Science

Published by

SCIENCE SERVICE

The Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by WATSON DAVIS

Subscription rates—$5.00 a year postpaid; two years, $7.00; 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Back numbers more than six months old, 25 cents.

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Publication Office, 1930 Clifton Ave., Baltimore, Md. Editorial and Executive Office, Constitution Ave. at 21st St., N. W., Washington, D. C.

Address all communications to Washington, D. C. Cable address: Scienserve, Washington.

Entered as second class matter October 1, 1926, at the post-office at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. and Canadian Patent Offices.

? DO YOU KNOW THAT ?

Two-thirds of all electric power used in South Germany is water generated.

Pineapple and cranberry are the latest fruits that are preserved by the frozen-pack method.

The sweet pea comes from Sicily, and was first brought to wider attention when an Italian monk sent seeds to Holland and England in 1695.

The Bureau of Mines has analyzed 115,000 samples of coal, to learn the heat and ash-producing qualities of coal from different mines and districts.

Aerial photographs have shown up the plan of an old Irish town which figures in traditions but could not be located by ground explorations.

Pictures of birds in flight taken from airplanes are a valuable aid in studying flock formations and in bird counts, says the Bureau of Biological Survey.

Among the mountains on the moon is a range called the lunar Apennines which is more than 400 miles long.

The birds known as flycatchers have the bad reputation of eating honeybees, but government biologists say that it is mostly drones that get eaten, and that the flycatchers make up for eating domestic bees by killing many bee enemies.

How Alexander the Great financed some of his conquests is shown by Prof. H. F. Lutz of the University of California, who estimates that Alexander took booty of $5,000,000 at the battle of Issus, over $141,000,000 at Persepolis, and $212,000,000 at Ecbatana.

The Citroen-Haardt Trans-Asiatic Expedition, traveling 8,000 miles across Asia, met temperatures ranging from 120 degrees above zero to 16 degrees below.

WITH THE SCIENCES THIS WEEK

OUR new index takes the form of curiosity-arousing questions concerning the most interesting and important news presented in each issue. These questions should be a mental stimulant for the adult reader and a boon to the teacher who uses the Science News Letter to add zest to her classroom instruction.

Book reference in italic type is not the source of information of the article, but a reference for further reading on the subject of the article. Books cited can be supplied by Librarian, Science Service, at publisher's price, prepaid in U. S.

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What will be Used to Remove Carbon Dioxide from Helium? p. 180

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A History of Egypt. Vol. 1—James Baikie—Macmillan, 1929, $10.50 (2 *Vol. set.*)

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What Comet Has Just Been Rediscovered? What Others Will Visit Us this Year? p. 181

The Stars for Sam—Harcourt, Brace—1931, $3.00

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What Discovery Made Possible the World's Largest Radio Tube? p. 187

Radio and Its Future—Ed. by Martin Codel-Harper, 1930, $4.00.

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Does the Compass Needle Tell the Earth's Secrets? p. 184

INVENTION

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Radio Movies—C. Francis Jenkins—Jenkins Laboratories, Inc., 1929, 50c.

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What Relation Have Dyes to T. B. Germs? p. 182

Is Hardening of the Arteries Due to Old Age? p. 177

What You Should Know About Health and Disease—Howard W. Haggard—Harper, 1928, $5.00.

PHYSIOLOGY

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What are Compounds "Small in Bulk but Large in Effect?" p. 177

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ZOOLOGY

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INVENTION

Invention Hastens Coming of Television in Movie Theatre

New Type Projector, Having Transparent Scanning Disc, Allows Images to Remain Continuously on Receiving Screen

TELEVISION to be shown on a large screen in the theatre is a step nearer reality following the invention in the laboratories of C. Francis Jenkins in Washington, D. C., of a new type of projector for the receiving set.

In the new apparatus a fixed lantern slide on which the objects move instead of being stationary as they are on common still slides takes the place of the flying light-spot system of reproducing the picture. This electrical rather than photographic scanning is accomplished by the substitution of a transparent scanning disc, which contains wires running out radially from its center like the spokes of a wheel, for the common metal disc containing a ring of pin-holes near its edge, Mr. Jenkins explained.

The inventor said that the new method puts 3,600 times more light on the screen than the old pin-hole scanning system. Light to the screen is never cut off except by images of the objects and these images remain on the screen all the time, it was pointed out. Never is the screen, or any part of it blank, as is the case even in motion picture projection for about one-third of the time.

The arrangement of apparatus, with which Mr. Jenkins has been able to accomplish in the laboratory what has been impossible even with well-developed motion picture projection, is very simple.

Scanning Disc Flat

Instead of being vertical, the transparent scanning disc is flat, and immediately beneath its wire spokes, which end where the usual metal disc would have pin-holes, there is a glass plate containing a thin film of an acid. The wires and the acid are subject to voltage controlled by in-coming signals.

A high voltage will cause sparks to jump from the ends of the wires to the acid. At low voltages there will be no spark. And each spark, Mr. Jenkins said, decomposes the acid and forms an air bubble in it. The bubble causes a dark spot to appear on the screen, but it quickly rises to the surface and breaks before another and slightly different image is formed in about one-fifteenth of a second.

"The projected picture on the screen is, therefore," Mr. Jenkins explained, "exactly like the usual lantern slide picture except that it has motion; or like a motion picture except that it is made up of changing picture elements instead of changing picture frames on a film. Incidentally, the elementary picture dots are so blended that they are as inconspicuous on the theatre screen as the dots of a newspaper illustration."

This system is still in the laboratory stage of development.

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VITAL STATISTICS

Child Deaths Lower In Spite of Depression

IN SPITE of the continuing business depression and increasing unemployment, the deathrate for children between one and fourteen years of age among families of insured wage earners was lower during 1931 than 1930, officers of the Metropolitan Life Insurance Company have just found from a statistical study of their records. In 1931 this deathrate was 2.65 per 1,000, while in 1930 it was 2.70 per 1,000. During the period from 1911 to 1915 it was 6.14 per 1,000.

The improvement is especially gratifying considering the changes in family economy which took place as a result of increasing unemployment during 1931, the officials pointed out.

"Much of the improvement in child mortality in 1931, as compared with the figures for 1930 and 1911-1915, can be ascribed to the cumulative effect of twenty years of work for child health by the public and private health promotion agencies of the country," they stated.

Health Services

"Part of the excellent record of the year 1931, itself, resulted from the continuation in that year, under most trying circumstances, of the health services established on the patterns laid down by the pioneers of child health conservation."

There was a greater decline in the death rate for children from one to four years than for the older children, the figures showed. This is considered a reflection of the decline in diphtheria mortality and in deaths from the other three important diseases affecting this age group, measles, scarlet fever and whooping cough. The whooping cough deathrate was lower in 1931 than at any time on record.

Science News Letter, March 19, 1932

WHERE THE TWAIN HAVE MET

East meets West under the beneficent light-giving symbol of Aten, the Sun's Disk, selected as God's hieroglyph by the enlightened Pharaoh Ikhaton, who was poor Tutankhamon's father-in-law. This splendid allegorical relief stands over the entrance of the Oriental Institute at the University of Chicago. In the background the Men of the West and their accomplishments face the Men of the East and the monuments of their ancient glory.

GEOLOGY

Ice of Glacial Yesteryear Leaves Mark on Western Rocks

MARKED with many fine lines that suggest the cuneiform writing of ancient Babylonia, are slabs of fine-grained stone, discovered by William D. Mark of Wallace, Idaho, while he was engaged in geological work for the U. S. Geological Survey some time ago. Even more do the patterns resemble the frostwork on a frozen windowpane.

And it is a fact that they were made in just that way—by finely branching crystals of ice; and they are so old that the day when Abraham departed out of Ur of the Chaldees was but as yesterday, compared to these stone slabs with the writing of Time itself on them. For they are somewhere near a thousand centuries old; they belong to the Pleistocene, the Ice Age, when all eastern North America, as far south as the Ohio River, was burdened with mile-thick glacial sheets.

But how could so fragile and fugitive a thing as a web of ice crystals carve its signature into a slab of rock? The answer is, it didn't. The ice crystals that made this writing formed in the sandy silt on the shore of Lake Bonneville, a tremendous lake that occupied a large part of the Great Basin region of the West, and of which Great Salt Lake is only a shrunken and bitter remnant. Later, after the crystals melted, the molded silt, still bearing their marks, was gently buried under other layers, and in time the whole hardened into stratified stone. There the ice-writing remained until the inquisitive pick of Mr. Mark pried apart the leaves of this ancient book of nature.

In the forthcoming issue of the *Journal of Geology*, Mr. Mark will report on experiments which he performed, showing how ice can form in sands and muds containing the right proportion of water, building knife-like crystals with their edges downward, and how, when the ice thaws, the marks of the ice will still be left.

The process that left these marks on the surface of the stone slabs where the edges of the lost Lake Bonneville used to be is being repeated every day now that spring is beginning to unlock the shores of rivers and ponds. Every one who has access to a quiet body of water that has been frozen may, in the course of an afternoon's walk, be able to find such ice impressions along its margin. If washing rains or careless trampling feet come that way, they will be destroyed forthwith; but if they have a chance to dry and harden, the next flood may bury them under an inch of mud without disturbing them. And there will be a record of the winter of 1931-32 sealed up and waiting for some scientist of the next geological epoch.

Science News Letter, March 19, 1932

SIGNATURE OF THE ICE

Cut as with cuneiform writing, but ages older than the earliest king in Babylon, is this slab of fine-grained stone from western Utah, telling of a hard winter on the shores of a vanished lake a thousand centuries ago.

ENGINEERING

New Tests Show Safety In Using Hot Cement

IT IS SAFE to use hot cement in paving concrete road, tests made under direction of the American Society of Testing Materials have shown. The general belief heretofore has been that hot cement would impair the appearance and strength of the finished product. Some state highway departments require that the cement when delivered on the job must not excede a standard temperature of 125 degrees Fahrenheit. The tests, however, show that there is virtually no difference in the quality of the concrete when the cement used has a temperature of 180 degrees Fahrenheit or more.

The tests were conducted, so a report to the *Engineering News-Record* reveals, on sections of a concrete road in northern Indiana. Cold cement was used as well as the hot for purposes of checking. It was found that up to three months the workability, compressive strength, change in volume and tendency to crack was virtually the same with both cements.

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ECONOMICS

Dial Telephones Add Almost Seventy Thousand to Jobless

THE MECHANICAL brains and fingers of the dial telephone system have reduced the number of jobs for telephone operators in the United States by more than 69,000. This is the estimate reported by the U. S. Bureau of Labor Statistics, which has surveyed the progress of the dial telephone and its industrial effects.

Complete conversion to the dial system means an average displacement of about two-thirds of the operators, the report states. And as the telephone-using public grows more fully accustomed to spinning the dial, even fewer operators will be needed to help out in emergencies. In addition, the trend now is toward automatic handling of simpler types of toll calls, a fact which may further reduce the number of operators employed.

In 1921, less than three per cent. of the telephones in the United States were of the dial type. By the end of 1930, very nearly one-third of the phones were dial-equipped.

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MEDICINE

Strict Lenten Observance Prevents Arterial Hardening

German Doctor Says Arteriosclerosis Is Defensive; Has Worked Out "Biblical Diet" for Its Correction

HARDENING of the arteries, called arteriosclerosis by medical men, is really not a disease but a device for mechanical protection of the arteries. It is not a condition due to old age nor is it necessarily incurable.

This unorthodox theory together with a new method of treating the condition has been proposed by Dr. J. Plesch, professor of internal medicine in the University of Berlin. In his report to *The Lancet*, Dr. Plesch described one feature of his treatment for the condition as a "Biblical diet" because, like certain fasting or dietary rituals of various religions, it introduces a "dietary day" once a week and a three or four week period of dieting once a year.

His method of treatment consists in first removing the causes as far as possible. Next efforts are directed toward relieving the overtaxed circulation. This should not be done, however, by the direct use of drugs which lower blood pressure through paralyzing the blood vessels, as these do more harm than good, Dr. Plesch thinks. Instead he prescribes frequent rests in the recumbent position during the treatment. Finally there is the dietary regimen which consists chiefly in living on a diet free from nitrogen (protein) and salt (sodium chloride) for one day a week regularly and for every day during a three or four week period once a year. Fresh air and complete mental relaxation are other features of Dr. Plesch's treatment.

At Every Age

"Arteriosclerosis is a disease that sets in at every age, that can be arrested and that can be cured in the early stages and beneficially influenced in the later stages; it is not an ailment of old age which must of necessity be progressive and incurable," Dr. Plesch declared. "It is often found in youthful people and often absent in the aged; and when it does make its appearance in old age it rarely has any serious consequences."

Arteriosclerosis is only one feature of a constitutional disease resulting in a lack of tone which chiefly affects the smooth muscles of the blood vessels, Dr. Plesch thinks. The actual hardening of the arteries he takes to be a protective process rather than a disease.

"The primary cause of arteriosclerosis is the weakening both of the muscular and of the elastic elements of the walls of the blood vessels."

If the weakened walls of the blood vessels are not able to offer enough resistance to the blood pressure they become stretched and dilated, he explained. At points especially exposed to high blood pressure, changes occur which are solely for the purpose of increasing the resistance of the walls. These changes, among them the hardening which gives the condition its popular name and which consists of deposits of lime, offer protection against breaks in the artery walls.

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PHYSIOLOGY

Milk Sugar Found to Aid Bone Growth in Chicks

MILK SUGAR or lactose helps to build up a strong, bony structure in the growing chick, E. B. Hart and his associates at the University of Wisconsin have found. Lactose is an important part of the milk produced by animals, making up nearly two-thirds of all the solids in human milk and from four-fifths to one-half of those in whole cow's milk. In skim milk or buttermilk, lactose makes up one-half of the total solids. The Wisconsin investigators found that lactose fed as from 10 to 40 per cent. of the chick ration gave a partial control of rickets and was one-half as effective as artificial sunlight in producing strong bones. The milk sugar also helped the chicks to make better use of the lime in their feed.

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PLANT PHYSIOLOGY

Sun's Unseen Radiation Speeds Growth of Plants

INDICATIONS that the invisible radiations of the sun influence the growth of plants by favoring the formation of lipides, compounds small in bulk but large in effect, are reported in *Science* by Prof. W. E. Tottingham of the University of Wisconsin.

Prof. Tottingham grew tomato plants under a special glass that transmits both ultraviolet and infra-red light. Chemical analyses of their leaves showed increase in percentage of lipides, as compared with the leaves of other plants grown under common glass. Plants of the test group exceeded those of the "control" group in earliness and size of crop when transplanted out of doors.

It is not yet known whether ultraviolet, or infra-red, or both, are responsible for the increase in the lipides and the more rapid growth and maturing of fruit. The next experiment will involve the use of a filter to take out the infra-red, to see how much of the effect may be attributed to the ultraviolet.

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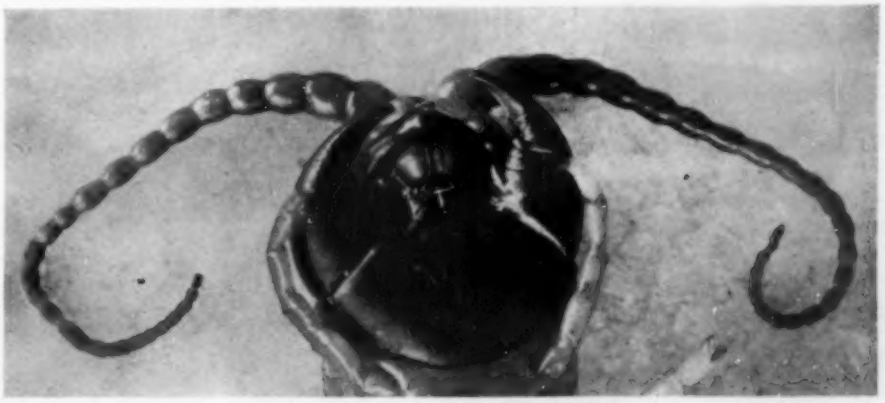


BLACK CRESCENT OF DEATH

—is the aspect presented by the formidable curved fangs and jaws of the centipede to many a luckless insect or other creeping thing. This striking enlarged photograph was taken by Cornelia Clarke.

EMBRYOLOGY

A Movie That Is All "Heart Interest"

First Motion Picture of Development of an Embryo Chicken Heart Marks Triumph in Laboratory Technique

By FRANK THONE

HOLLYWOOD'S celluloid Napoleons will tell you unanimously that a film has got to have heart interest if it's going to "get over big."

If that dictum is true, then certainly a film which is now in the making in Cleveland ought to beat the best Hollywood product all hollow. For it's an affair of the heart from beginning to end. Every foot—every frame—is focussed on the most fascinating and most active piece of all the bodily mechanism.

To be sure, it's only the heart of a chicken. Not even the heart of one of the delectable slim-legged *poulettes* who high-heel in swarms wherever the celluloid Napoleons decree a sceneful of "extras, female"; no, nothing but a downy, cuddly chick that eventually grows up into a cackling, flowerbed-scratching Biddy, with no ambition beyond inspiring omelets and eventually herself becoming casserole filling.

Nevertheless, the heart affairs of even so lowly a citizeness form a most absorbing drama, of interest and practical importance to all of us. For the Colonel's Lady and Judy O'Grady are sisters under their skin, as Kipling melodically claims; and the democracy of nature extends far beyond that, to include Judy O'Grady's hens. Basically, all heart-beats, whether human or hen, start in the same way, involve much the same nervous and muscular machinery, and can be intensified or depressed by the same drugs and glandular secretions. So we can learn much about our own life process by clipping open incubated eggs and studying the early heart-beats of the chick inside.

The new film emancipates embryology from the messiness, from the tedium, from the deadness, from the whole hard grind of the laboratory, and brings it out where not only college seniors but anybody and everybody can get something out of it and capture a vivid idea of how life begins, how the heart starts its unintermitting pulsation, how the blood forms and begins to flow.

The scientists who have made this new magic are three: Prof. Bradley M. Patten of Western Reserve University School of Medicine, embryologist; S. Prentiss Baldwin, successful business man and by avocation a distinguished naturalist, and Theodore C. Kramer, research assistant at the Baldwin Laboratory, who proved to be a genius at inventing necessary gadgets and a natural adept in the manipulation of living material. The idea came into being once when Mr. Baldwin asked Prof. Patten to come out to his unique field laboratory in a bird sanctuary near Cleveland and show him what was going on inside the eggshell. Mr. Baldwin was fascinated at the pulsating drama spread out under the lens of the microscope.

Surmounting Difficulties

"There ought to be movies of this!" he exclaimed. "Has it ever been done?"

The embryologist had never heard of it; he knew vaguely something of the difficulties involved, both technical and fiscal but did not feel that they would be insurmountable.

"Tell you what," said the enthusiastic Mr. Baldwin: "You put in the time and biological experience, and I'll supply the money."

So it was started; and the skilled Mr. Kramer transferred himself from Mr. Baldwin's laboratory to Prof. Patten's, and helped in the difficult job of evolving the right combination of microscope and motion picture camera and lights that had to be built specially for the work. About the motion-picture end of the task Prof. Patten does not talk much, except to say that it wasn't at all easy. Several times they thought they had the job licked, only to find new technical difficulties that made it necessary to tear the whole layout apart and start all over again. In these trying times the advice of Mr. E. S. Carpenter, a local movie expert who had become interested in the problem, proved valuable. At last they got an apparatus built that makes the pictures exactly as they want them.

As for the winning of the secrets of the first heart-beats, the film itself shows how it was done, though it gives only a few hints of the technical skill that was necessary for the handling of the delicate living material, and tells nothing of the patience with which a scientist must begin anew after each setback or failure. The smooth-running half-hour of life drama that you can see on the screen is the fruit of many months of often disheartening labor.

The opening scene shows the beginning: getting the embryo out of the eggshell so that it can be seen and studied. It would really be more considerate of the hen if she would lay eggs with shells of glass instead of limestone, for then all this preliminary labor might be spared. But as it is, the embryo has to be lifted out of the egg and placed in an artificial glass house for its brief career as a movie star. It is not unlike the Hollywood favorites in the amount of privacy it gets during its time in the spotlight.

At first you see the outline of the unbroken egg. Then, by swift animated drawings, the cutting away of a circle of the shell is shown, disclosing the little spot of life resting on top of the yolk. Into the picture come the scientist's fingers, with a pair of needle-pointed scissors that clip free the delicate membrane with the embryo in its

BEATS HOLLYWOOD

Three steps in preparing the chick embryo for its movie debut, and two "close-ups" from the film.

center, and lift it out of the egg on a flat bit of thin metal.

The idea of moving the actual hands of the operator into the animated drawing and synchronizing them with its action, was declared impractical by professional camera experts; but Prof. Patten proved to them that it could be done. It was merely a matter of controlling one's movements, making them sufficiently slow and smooth.

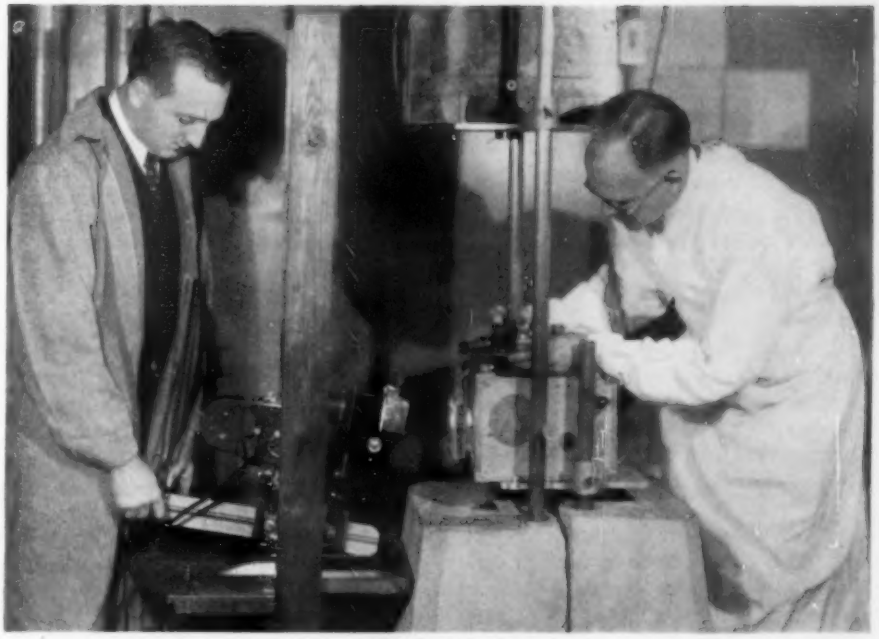
Delicate Job

Then comes the delicate job of stretching that bit of living membrane with the embryo at its center on a small sheet of glass, so that it can be placed under the microscope and photographed. You see the operator, with a special magnifying device strapped before his eyes, bending over his task, carefully pulling the edges smooth and fastening them down with bits of sterilized wet filter paper. This must be done rapidly, yet not in a hurry; here is where technique really counts.

The glass slip now becomes the top of the square "glass egg" in which the embryo lives while it is "in the pictures." The slip, embryo and all, is inverted and set as a lid on a glass box, the edges sealed against the air with vaseline. To lay down this seal, an old hypodermic syringe is filled with vaseline and used as a miniature grease gun.

Within its "glass egg" the embryo is nourished on solutions artificially made up more or less in imitation of the fluid portion of the blood. Such fluids have for some years been used with success in keeping minute pieces of tissue alive, but the difficulties of keeping an entire embryo properly nourished and free from toxic waste products are much greater. The longest that Prof. Patten has been able to keep an entire embryo alive and under continuous photographic observation has been thirty hours. Unfortunately he is not able to give them unmodified egg yolk, their natural food, for that is opaque and would interfere with the photography. So many partially incubated eggs have had to be sacrificed to make his film. He is still experimenting with nutrient media, hoping to find something better than the ones now being used.

However, during the brief span that is allowed it outside the eggshell, the embryo carries on its life processes apparently normally, though at a somewhat lower rate than that prevailing under natural conditions. You can see, in the bright circle of the microscope's illuminated field, the lump that is destined to be the head, with its bulges that will be eyes. You can see the segmented muscles of the body, and the growing spinal cord.



MOVIE STAR

Theodore C. Kramer, left, and Prof. Bradley M. Patten putting the heart of an embryo chick "in the pictures."

But most dramatically of all, you can see the heart, the only thing that shows pronounced movement even in early stages of life. After only a day and a half of incubation, it bulges forth at one side, quite out of proportion to the rest of the body.

Its first beats are not the even, rhythmical pulsations that are characteristic of heart action once it has really got going. They are unevenly spaced, tentative, sometimes a few in quick succession, again coming many minutes apart. To picture them, it was necessary to run the camera at normal speed of sixteen exposures a second while a spell of beating was on, and then wait for the heart to begin again.

During the first uncertain stage in the development of the heart beat, when the heart is really preparing for its task, you can see things in this film that no book will tell you. Prof. Patten was able to show that the beat starts in different parts of the heart at different stages in its development, and further that the region that has always been believed to be the first part of the heart to become active did not begin to function until other parts of the heart had long been at work.

The eye of the camera shifts, out onto the membranes enveloping the yolk, to which arteries and veins run from the embryo. You see the smallest blood channels, and along them, pushing in crowds, the red corpuscles. The circulation is a going concern, and the heart will keep up the steady pulsation you see as long as life lasts.

Yet other wonders are shown by the film before the "Finis" title flashes on the screen. The embryo not only provides itself with blood-vessel supply lines to the food stored in the yolk; it must have oxygen, too. Obviously, its lungs, as yet undeveloped, can be of no use to it. It therefore takes care of its respiratory requirements by means of a second membrane, a sac-like organ called the "allantois," almost as large as the embryo itself and supplied with blood vessels to and from the heart.

Meanwhile, the whole little unhatched chick is enveloped in a third membrane known as the "amnion." This keeps it moist, guards it against mechanical injury, and as it advances in days begins to rock it rhythmically.

And here, fed from its yolk-sac, breathing through its allantois and rocked in its amnion, the film leaves the little chick—always to a burst of applause by the small audiences of scientists and laymen who have thus far seen the film in its pre-views. Before long it will be seen by many others, for arrangements are being made to place a copy of the film on permanent run at the museum of the National Academy of Sciences in Washington.

CONSERVATION

Tax on Shotgun Shells To Help Conserve Game

SHOTGUN SHELLS will be saviors as well as destroyers of game, if Congress passes a new federal tax of one cent each, proposed in a bill which will be introduced within a few days, with the backing of the American Game Conference.

The bill will provide that all the money thus collected is to be used as follows: Not to exceed five per cent. of the total to be used for federal administration, research and enforcement; 55 per cent. of the balance to be allotted to the game departments of the various states, based on the number of hunting licenses issued, for the increase of game and waterfowl. A refund for shells used in trap shooting will be made by the states.

The remaining 45 per cent. will be expended by the federal government for the increase of waterfowl through acquisition or control, especially of breeding areas and also of additional refuge and concentration areas wherever they exist or can be restored.

Refuges will be established on the lines of migratory flight, coordinating with a system of concentration areas for winter use. An earnest attempt is to be made to secure the cooperation of Canada where are located the greatest and best of all breeding areas. The establishment of an international agency for this purpose will be sought.

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GEOLOGY

Explosions Used to Locate Oil Fields in Southwest

See Front Cover

A BEAUTIFUL explosion, so large that the camera could only catch a part of it with sufficient clarity to detail its streaked and billowing effects, is reproduced on the front cover of this week's SCIENCE NEWS LETTER. It is one of hundreds of such blasts that have located valuable new oil fields along the Gulf coast of Texas and Louisiana.

Several hundred pounds of dynamite buried about twenty feet deep is detonated. It explodes with terrific force, sending miniature earthquake shocks out in all directions. Some of these earth vibrations travel smoothly and swiftly through uniform materials; the paths of others are broken by irregular underground formations. Portable seismographs record the waves, and from a study of these records remarkably accurate knowledge of the physical properties and structure of the underground rocks is obtained.

In this manner a number of salt domes have been located beneath which drills found profitable stores of oil. Along the Gulf coast of Texas and Louisiana, where salt domes deep in the earth often indicate the presence of oil, more than fifty proven domes have been found since the successful introduction of geophysical prospecting in 1924.

The success of the earthquake recorder in locating oil on the Gulf coast focused world wide attention on this method of studying the structure of the earth thousands of feet below the surface. It has been applied to many forms of geological research. From the Gulf coast it spread to the mid-continent and California, and to other parts of the world, chiefly the Argentine, Venezuela, Russia, Roumania, Persia, North Germany and the Dutch East Indies.

The photographer of the striking cover illustration is O. C. Petty of San Antonio, Texas.

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AERONAUTICS

Navy to Have New Plant For Helium Purification

A NEW plant for the purification of the rare gas helium which is used in Navy airships is being planned by the U. S. Navy Department.

The new plant, for which bids will be opened on April 6, will be located at the Navy's new airship base at Sunnyvale, Calif. It is to have two units, each of which is to be a complete and self-contained outfit for the repurification of helium. Each unit will have a capacity of 15,000 cubic feet of impure helium per hour.

The Navy finds it necessary to maintain such a repurification plant because no fabric has yet been found which will completely exclude air from the airship cells containing precious helium.

A novel feature in the specifications of the new plant as issued to firms interested in bidding is the requirement that carbon dioxide shall be removed from the helium through the use of lithium hydroxide, a chemical used in alkaline storage batteries. Lithium hydroxide has never before been used commercially for this purpose.

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IN SCIENC

AVIATION

Safety Primary Feature Of New Mammoth Airplane

A NEW GIANT plane, with safety as its primary feature, has been constructed by the Dornier firm, builders of the huge "Do-X," and will be used by the German Air-Hansa, one of the leading Continental commercial air navigation companies. The new plane bears the designation "Do-K."

As described in the German scientific weekly *Die Umschau*, the "Do-K" is propelled by four air-cooled motors mounted under the wings in pairs, so that two of the propellers are "pullers," the other two "pushers." It is stated that the big plane can remain in the air if three out of her four motors go out of commission, and that she can be successfully maneuvered with only two of them going, even if they both happen to be on the same side. Because of these safety features, the "Do-K" is considered especially fit for night flights, and also for use over areas such as the Alps where emergency landings are impossible.

An average speed of about 125 miles an hour can be maintained, it is stated, with a practicable maximum of 140 miles an hour. A high fuel economy is also claimed.

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PLANT PHYSIOLOGY

Down-Growing Leaves Warn Of Leaks in Gas Fittings

TOMATO PLANTS are being used to detect illuminating gas leaks and the presence of other toxic gases in laboratories and greenhouses at Yale University, according to Prof. Carl G. Deuber, of the Botany Department. These plants are being used in the same way that canaries are used in mines.

In the presence of the merest traces of toxic gases the younger leaf-stems of the tomato plant grow downward, due to a more rapid growth of the cells on their upper sides. This is an absolutely reliable test for illuminating gas leaks, Prof. Deuber found.

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NCE FIELDS

PSYCHOLOGY

Deaf Persons Advised To Make Social Contacts

DEAF persons should use lip reading and hearing devices as aids in making contacts with normal persons, Ada Morgan Hill, director of the department of vocational advice of the American Federation of Organizations for the Hard of Hearing, said in a report to the Handicapped Section of the National Vocational Guidance Association.

"A deafened man's attitude toward life, his fellow workers and employers must be as nearly that of a normal person as possible. Children can be so trained and guided that they know no other attitude. Most of the adult hard of hearing today must be re-trained."

The vocational counsellor should direct the deaf person into trades and professions which do not require hearing acuity for success, Miss Hill said. But she pointed out that, on the other hand, the hard of hearing must not be greatly restricted, for many deafened persons are carrying on successfully in occupations which might seem closed to them. Their success is due to their resourcefulness and adaptability.

"Deafness should be looked upon as a handicap, not as an affliction," she said.

Although she emphasized the importance of finding and aiding the hard of hearing child in school, she does not approve of special classes for such children.

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ACOUSTICS

Engineers Aid Paderewski In Huge Piano Recital

HOW, in what critics call "the biggest piano recital on record," music from Paderewski's instrument was carried to 16,000 people in Madison Square Garden without the thin twang which a piano has when played in the great open spaces, has been revealed by acoustic engineers.

Listeners more than a block from the player were able to hear as well as those close to the piano because 47,000 square feet of sound-absorbing material had been stretched like a giant blanket over the heads of the audience, the engineers said. The false ceiling had been constructed after a careful investigation by representatives of Electrical Research Products Inc.

The chief difficulty with the acoustics of the big auditorium arose from the excessive reverberation, it was explained. Reverberation is the prolongation of sound by echoes from the walls and ceiling. A certain amount of it produces a natural effect, but if echoes are too long sustained they produce a jumbled sound.

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ASTRONOMY

Comet on Visit to Sun Re-Found by Astronomer

GRIGG COMET, a periodic visitor to the sun, has just been rediscovered by Dr. George Van Biesbroeck of Yerkes Observatory.

It is a faint object of sixteenth magnitude located in the constellation of Orion, the group of stars that can be seen in the southwestern evening skies. The Grigg comet, however, can be seen only with the largest telescopes. The location of the Grigg comet when discovered on Saturday evening (March 5) was right ascension 5 hours 31 minutes 49.3 seconds and declination north 5 degrees 3 minutes. It had no tail.

Astronomers throughout the world were notified of the reappearance of the comet by means of astronomical telegrams sent through Harvard College Observatory, Cambridge, Mass.

Dr. Van Biesbroeck was also the first to sight this periodic comet when it made its last return in 1927. The astronomer Grigg, whose name the comet bears, first discovered it in 1902. Then the comet was missed on its subsequent returns until 1922 when J. F. Skjellerup, an Australian astronomer, found it again. The comet is therefore sometimes called the Grigg-Skjellerup comet.

The Grigg-Skjellerup comet is one of nine periodic cometary visitors to this region of the solar system that may be expected this year. Those most likely to be observed are: Tempel's comet, Neujmin's second comet, Kopff's comet, Borelly's comet, Brooks' second comet, and Faye's comet.

On its previous visits the Grigg-Skjellerup comet has not been seen with the naked eye and it is therefore very unlikely that it will be easily seen by the public this time.

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PHYSICS

Electron Particles Again Made to Break into Waves

REPETITION by a modified method of the epoch-making experiments which first proved that electrons can behave as waves, has been reported to the American Physical Society by Drs. C. J. Davisson and L. H. Germer, scientists of the Bell Telephone Laboratories, New York, who won fame some years ago by their pioneer experiments.

A stream of electrons moving at high speeds was directed at a nearly glancing angle towards an etched metal surface, and caught on a photographic plate where the diffraction rings formed showed that the electrons behaved like light waves. Previously untried metals and a new method devised by Prof. G. P. Thomson of the Imperial College of Science and Technology in London were used in the recent experiments. Patterns of about 20 rings were obtained in the new experiments of Drs. Davisson and Germer from the metals gold, tungsten, molybdenum, cobalt, nickel, chromium and platinum. The arrangement of the rings was characteristic of the known structure of the metals.

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ZOOLOGY

Eagle Defeats Coyote In Battle on Frozen River

"A THRILLING battle between air and ground forces" is the way Ranger Andy Fluetsch of Glacier National Park describes a recent affray between a golden eagle and a coyote.

While patroling up the frozen surface of Kintla Lake, Ranger Fluetsch noticed a coyote starting across, carrying a large piece of deer meat. Then he saw a large golden eagle hovering overhead. Suddenly the bird executed a full-power dive, crashing into the coyote broadside and knocking him flat on the ground, with the result that the meat went sliding down the smooth surface of the ice.

As soon as both combatants recovered from the impact the fight started, the coyote charging the eagle, only to be beaten off with beak, talons, and wings. Fur and feathers flew in all directions.

At the first opportunity the eagle again got into the air and made repeated swoops down upon the coyote, knocking him flat each time he struck. Finally the coyote retreated to the woods and the eagle flew off with the meat.

Science News Letter, March 19, 1932

MEDICINE

Discovery of the Tubercle Bacillus

"A Classic of Science"

March 24 Is the Fiftieth Anniversary of This Event
The First Part of Koch's Paper Is Translated Here

DIE AETIOLOGIE DER TUBERCULOSE (The Etiology of Tuberculosis) von Dr. Robert Koch. In Berliner Klinische Wochenschrift, neunzehnter Jahrgang, No. 15. Berlin, 10 April, 1882. Translated for the SCIENCE NEWS LETTER *by Helen M. Davis.*

THE discovery of Villemin that the tuberculosis of animals is contagious has, as is well known, met multiple confirmation, yet also apparently well founded opposition, so that the question whether tuberculosis is an infectious disease or not had to remain undecided for several years. Since then inoculations into the anterior chamber of the eye, performed first by Cohnheim and Salomonsen, later by Baumgarten, and further the inhalation experiments of Tappeiner and others safely established the contagiousness of tuberculosis beyond all doubt, and it must in the future be assigned a place under infectious diseases.

If the number of victims which a disease takes can be taken as a measure of its importance, then all illnesses, and even the most dreaded infectious diseases, pest, cholera, etc., must be placed far behind tuberculosis. Statistics teach that one-seventh of all persons die of tuberculosis and that, if only the middle productive age class is taken into consideration, tuberculosis carries off a third of them and often more. Public health work thus has reason enough to devote its attention to so murderous a disease, without taking into consideration other circumstances, among which only the relation of tuberculosis to bovine tuberculosis need be mentioned, in which public health work has an interest.

Since, from the standpoint of care for the public health, it is now among the duties of the health officer to make infectious diseases the object of investigation, particularly with respect to their etiology, it seems an urgent duty to put inauguration of research on tuberculosis before everything else.

Determination of the nature of tuberculosis has been attempted repeatedly, but until now without result. The methods of staining which have so often proved valuable in the study of other pathogenic micro-organisms have failed us in this disease and attempts at isolation and culture of the tubercle virus hitherto have not been successful, so that Cohnheim, in the latest edition of his work on general pathology, just issued, has had to point out that a "direct proof of the tuberculous virus is a still unsolved problem."

Abandoned Usual Methods

In my researches on tuberculosis I in the beginning employed the usual methods, without getting any enlightenment upon the nature of the disease. But through some chance observations I was led to abandon these methods and to try another way which finally led to positive results.

The aim of the investigation must be directed first to the discovery of any parasitical organisms foreign to the body, which might serve as the source of disease. It was also part of this investigation to find hitherto unknown bacteria in all organs characteristically altered by tuberculosis, with the aid of a distinctive staining reaction. It would lead too far to describe the way in which I arrived at this new method and I will therefore proceed to the description of it.

The material for investigation is prepared in the well known manner usual in investigation for pathogenic bacteria, either spread out on a cover-glass, dried and heated, or, after hardening in alcohol, cut in sections. The cover-glass or section is put into a staining solution of the following composition. 200 cc distilled water is mixed with 1 cc of a concentrated alcoholic solution of methylene blue, shaken and to it is added with repeated shaking 0.2 cc of a 10% solution of potassium hydroxide. This mixture should give no precipitate upon standing for a day. The object to be stained remains in this for 20 to 24 hours. By warming the staining solution to 40° C. on the water bath this time can be reduced to ½ or 1 hour. After this the cover-glass is rinsed with a concentrated water-solution of *Vesuvin* (Bismarck Brown), which must be filtered each time before using, and after one or two minutes washed with distilled water. When the cover-glass comes out of the methylene blue it appears to have a dark blue layer sticking to it and it is strongly overdyed, through the treatment with *Vesuvin* the blue color is lost and it is changed to a weak brown. Under the microscope all constituents of the animal tissue, namely the cell nuclei and their disintegration products, now appear brown, the tubercle bacteria on the other hand are dyed a beautiful blue. All other bacteria which I have so far studied, with the exception of the lepra bacillus, by this method of staining change to a brown color. The color contrast between the brown stained tissues and the blue tubercle bacteria is so striking that the latter, which are often present only in very small numbers, can nevertheless be detected with the greatest accuracy and recognized as such.

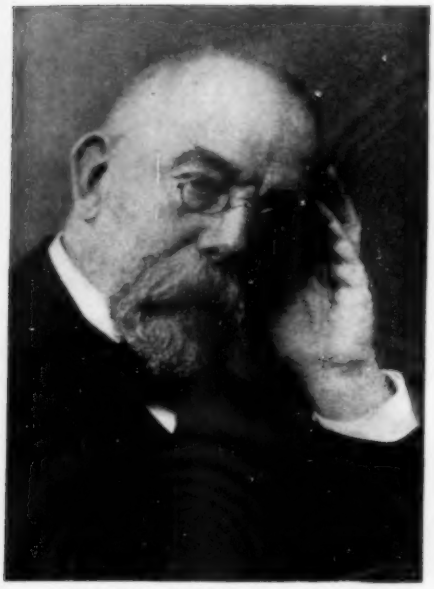
The sections are handled quite similarly. They are taken out of the methylene blue solution into the filtered *Vesuvin* solution, left in it for 15 or 20 minutes, and then washed in distilled water till the blue color is washed away and a more or less strong brown tint is left. Afterward they are washed with alcohol, cleared with oil of cloves, and can then be examined microscopically in the same fluid or finally mounted in Canada balsam. In this preparation also the constituents of the tissues appear

A process in the direct line of descent to

MODERN PHOTOGRAPHY

was discovered 130 years ago by T. Wedgwood who announced that it needed only a fixing agent to "render the process as useful as it is elegant." The fixing agent was discovered a generation later by Sir John Herschel who added the idea of photographic prints on paper. These accounts form the next

CLASSIC OF SCIENCE



ROBERT KOCH (1843-1910)
German Bacteriologist, discoverer of the tubercle bacillus.

brown and the tubercle bacteria are stained a sprightly blue.

Although the bacteria are not indeed dyed exclusively by methylene blue, but take up other aniline dyes, with the exception of brown dyestuffs, under the simultaneous action of alkalies, yet the color with the others is not so beautifully developed as with methylene blue. Moreover the caustic potash may be replaced by caustic soda or ammonia, from which it appears that the potassium does not play an essential role, but only the strongly alkaline nature of the solution is necessary. Therefore it might be said that with a still stronger alkaline content some bacteria might be colored which in a weaker solution would not appear. But the tissues of the section would shrink and change so much under the influence of a stronger caustic solution that the latter would only occasionally be of advantage.

The bacteria made visible by this procedure show a peculiar behavior in many respects. They have a rod-like shape and so belong to the group of bacilli. They are very thin and from one-fourth to one-half as long as the diameter of a red blood corpuscle, occasionally they may reach a greater length, up to the full diameter of a blood corpuscle. In shape and size they show a striking resemblance to the lepra bacilli. But they may be distinguished from the latter because they are a little more slender and pointed on the ends. Also the lepra bacilli take up the coloring if you use Weigert's nuclear staining, while tubercle bacilli do not. In all places where the tuberculous process is found in fresh onset and in rapid development, the bacilli are found in great numbers; they then usually appear grouped closely together and often tied together in little bundles which many times lie in the interior of cells and here and there present a picture like that of lepra bacilli heaped up in the cells. Nearby also occur many free bacilli. Especially at the edge of great cheesy masses are found only numbers of bacilli which are not enclosed in cells.

Fewer After Crisis

As soon as the climax of the tuberculous eruption is past, the bacilli become fewer, are found only in little groups or entirely isolated around the edge of the tubercular lesion near weakly colored and here and there scarcely recognizable bacilli which probably are in the act of dying or are already dead. Finally they can disappear entirely, yet they are seldom completely missing and then only in places where the tuberculous process has come to a standstill.

If giant cells appear in the tubercular tissue, the bacilli lie chiefly in the interior of these structures. In tubercular infections progressing very slowly the interior of the giant cells is usually the only place where the bacilli may be found. In this case most of the giant cells enclose one or a few bacilli and it makes a surprising impression to keep finding in widely separated thin sections always new groups of giant cells, in which almost every one holds, in the large enclosed space around brown-stained nuclei, one or two tiny blue rods floating almost in the center of the giant cell. Often the bacilli are to be found only in small groups of giant cells, often only in single specimens, while at the same time many other giant cells are free from them. In that case those containing bacilli are the younger giant cells, as may be known from their size and position, while the bacilli-free are older, and it may be assumed that the latter also originally contained bacilli but that they are dead or have gone over into the dormant condition soon to be described. By analogy with the formation of giant cells around foreign bodies, such as vegetable fibers and *Strongylus* eggs, discovered by *Weiss, Friedlaender* and *Laulamié*, one may imagine the relation of the giant cells to the bacilli such that here too the bacilli are taken up by the giant cells (*Please turn page*)

EVOLUTION

Ice Water Possible Cause Of Evolutionary Speeding

ICE WATER in large doses, following the melting of the great continental glaciers, may have been an indirect cause of the speeding up of evolutionary changes that seem to have followed each of the earth's great ice ages. This is one of the suggestions arising out of the researches of T. Cunliffe Barnes of Yale University.

To this might be added the speculation that a like effect may be operative more or less constantly in frosty northern lands, where evolution seems to be more rapid than in the languid, conservative tropics. Each winter, a miniature ice age, may give a little push to evolution, just as a glacial epoch may have given a big push.

The research on which these suggestions are based was conducted with *Spirogyra*, a microscopic green plant common in sluggish fresh waters. Growths of equal size were started in each of three kinds of water. One was water in which most of the molecules of H_2O are free and unattached—a state most nearly fully attained in steam. The second kind was "common" water, in which most of the H_2O groups are bound together in paired molecules. The third was "trihydrol" water, with its H_2O groups predominantly three in a bunch. Ice is richest in trihydrol, but water from recently melted ice also contains large numbers of trihydrol molecules. Mr. Barnes found that by far the most vigorous growth of his *Spirogyra* cultures took place in trihydrol water.

Whether trihydrol consumed by human beings in the form of ice water will make them grow faster, or have any other effect on their health, is not stated.

Mr. Barnes is at present working on the effect of trihydrol on some of the simpler animal forms, and expects to report in a future publication.

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as foreign bodies and therefore, if the giant cells are found empty, the hypothesis is justified that all the other circumstances in the tubercular process mean that earlier they lodged one or more bacilli and this cause gave rise to them.

The bacilli may also be observed unstained in an unprepared condition. For this it is necessary to examine a little material from a place which contains considerable numbers of bacilli, e. g., a little gray tubercular nodule from the lung of a guinea pig which has died from inoculated tuberculosis,—with the addition of distilled water, or better, blood serum, which happens to be most suitable for avoiding currents in the liquid on the stage of the high power microscope. The bacilli then appear as very fine rods, which show only molecular motion, but do not possess the slightest motion of their own.

Under certain conditions to be described later the bacilli form spores in animal bodies and in fact the individual bacilli form several, usually two to four spores, oval in shape, which are distributed at symmetrical distances along the length of the bacillus. . . .

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Hans Christian Oersted

When Oersted in 1820 wanted to inform the world that he had discovered the relation between the old force of magnetism and the new force of electricity, he wrote the account in the universal language of Latin and circulated it among scientists of all countries. To his account he signed his name in the Latinized form "Johan." In England the editor of *Annals of Philosophy* translated it into English, and gave his name the English form of "John Christian Oersted." This translation, made in the year of the discovery, was used as a Classic of Science in the SCIENCE NEWS LETTER, February 20, 1932. The possibility that this century-old mistranslation may mislead modern students has been called to our attention by Niels C. Ortved, President of the Detroit Motorbus Company, who presented to the Museum of Science and Industry, in Chicago, the bronze tablet, executed by the sculptor A. J. Bundgaard, from which the illustration accompanying the Classic was taken.

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The slow process of erosion has changed the surface of the earth more than all the earthquakes, volcanoes, tidal waves, tornadoes, and excavations in history.

GEOPHYSICS

Wobble of Compass Needle Reveals Inner Earth Secrets

Study of Terrestrial Magnetism Also Helps Explain Conditions of Upper Atmosphere and Activity on the Sun

A BETTER understanding of events deep within the earth has been made possible during the past few years through research by scientists who know how to read the language of the subterranean happenings as written in the varying of the compass needle from true north, John A. Fleming, acting director of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, has revealed.

Mr. Fleming presented conclusions reached after careful study of all data collected during past centuries including information taken in recent years from more than 10,000 stations established in different parts of the world by the Carnegie Institution. Thus the most complete picture possible of the long period or secular variation of the earth's magnetism is obtained.

"The relation of large and rapid'y changing rates of change of the intensity and direction of the magnetic field to the surface structure of the earth can scarcely be accidental," Mr. Fleming declared. "It is natural to expect that there is a causal relationship existing between crustal and subcrustal movements and these magnetic manifestations. Perhaps there are changing mechanical stresses, or possibly a changing distribution of internal heat, which in turn affects the direction or magnitude of subterranean electric currents.

"Thus secular variation changes within the earth's crust indicate an interior more mobile than the exterior layers, not only as a whole but regionally."

The great secular variations, which over the period of actual observation of several hundred years, caused the compass needle to change its direction by as much as 15 to 20 degrees at some places on the earth, are now better understood, following detailed mathematical analyses of data for periods centering around 1842, 1882 and 1922 by scientists of the Department of Terrestrial Magnetism. Thus it is known that the main cause of the secular variation arises from a system of forces embedded in the earth, Mr. Fleming said. This variation is caused not only by a change in the direction of magnetization but also by a change in its intensity.

Magnetic force has been decreasing more rapidly in the southern, or water hemisphere, than in the northern, or land hemisphere, he continued. The average equivalent intensity of magnetization over land areas is somewhat larger than that over ocean areas.

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ARCHAEOLOGY

Portrait of Seneferu Discovered in Egypt

A PORTRAIT of the Pharaoh Seneferu, builder of the Great Pyramid at Meydum, has been discovered on a limestone slab, says a report just received from Alan Rowe, field director of the University of Pennsylvania Museum expedition at Meydum, Egypt.

The portrait shows Seneferu wearing a close-fitting cap above which are the horns of a ram supporting two curved plumes. The king wears a long false beard and carries a scepter in his hand.

"Importance of the portrait head," says Mr. Rowe's report, "lies in the fact that, so far as is known, it is the only contemporary portrait of King Seneferu ever found in Egypt. Other pictures of the King have been found in Sinai, but only one of them can be called a portrait."

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PLANT PHYSIOLOGY

Frozen-Pack Pineapple Retains Digestive Power

JUICE of pineapple preserved by the frozen-pack method keeps its power to digest proteins. This is one of the results of a series of experiments conducted at the new frozen-pack laboratory of the Bureau of Plant Industry, U. S. Department of Agriculture, under the direction of H. C. Diehl.

It has been long known that the juice

of raw fresh pineapple has in it a digestive enzym similar to pepsin in its ability to digest proteins. A common experiment in elementary biology, which anybody can perform at home if he likes, is to drop a cube of hard-boiled egg white, which is nearly pure protein, into a couple of teaspoonfuls of pineapple juice. After a day or so the cube will dissolve in the juice. However, heating the juice destroys this digestive enzyme, so that pineapple preserved by methods now in use, while still good fruit, does not have this peculiar value as a "booster" to digestion.

Pineapple preserved by the frozen-pack method, with the addition of either syrup or sugar, has a most attractive flavor and a rich golden color, Mr. Diehl states. Although other frozen-packed fruits are now on the market, pineapple preserved in this way has not yet made its commercial debut.

Other products which have been satisfactorily preserved by the frozen-pack method in the new laboratory are peaches, Japanese persimmons, apples, several kinds of berries, peas, beans, carrots, cauliflower, mushrooms and other vegetables.

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MEDICINE

Birth Deformity Being Treated in New Clinic

A CLINIC for a new and special treatment of congenital dislocation of the hip, the most frequent of all deformities with which children may be born, has just been opened at the Lenox Hill Hospital in New York. It will be in charge of Dr. Charles H. Jaeger, who has devised the new and successful non-operative treatment.

Because there are no striking deformities at birth, this unfortunate condition often goes unrecognized until the child begins to walk, Dr. Jaeger explained. By this time serious changes and deformities have occurred in the socket of the hip joint and the head of the thigh bone which make a perfect cure difficult if not impossible. In spite of long and painful treatment, such patients have often been obliged to go through life with a shortened leg and a seriously lessened earning ability.

The new method of treatment consists of holding the leg outward by means of a brace and exerting by means of an adjustable pad a gentle pressure downward and inward upon the upper end of the thigh bone.

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VVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVV

THESE 7 GREAT SCIENTISTS

want to talk to you in your home

DR. ROBERT A. MILLIKAN, Nobel prize winner in physics, leader in scientific thought and head of the California Institute of Technology, speaks on *"The Rise of Physics"*.

DR. JOHN C. MERRIAM, authority on the fossil animals and reptiles of western America, president of the Carnegie Institution of Washington, speaks on *"The Record of the Rocks"*.

DR. EDWIN G. CONKLIN, Princeton University biologist, one of the world's greatest authorities on life processes, speaks on *"The Mystery of Life"*.

DR. KARL T. COMPTON, eminent physicist, president of the Massachusetts Institute of Technology, speaks on *"Science and Engineering."*

DR. LEO H. BAEKELAND, industrial chemist and one of America's industrial pioneers, inventor of bakelite, velox, etc., speaks on *"Chemistry and Civilization"*.

DR. WILLIAM H. WELCH, of Johns Hopkins University, "Dean of American Medicine" speaks on *"The Tubercle Bacillus"*.

DR. WILLIAM M. MANN, director of the National Zoological Park of the Smithsonian Institution, leading authority on animal life, speaks on *"Our Animal Friends"*.

SCIENCE is absorbingly interesting. Scientists bring forth new points of view, new discoveries, new relationships of old discoveries, and thus they themselves are absorbingly interesting as human beings.

Men and women of intellectual curiosity would like to entertain many of these scientists, one by one, in their homes, but this is usually impracticable.

1 So Science Service, Inc., asked seven great scientists to make phonograph records on subjects which fired their enthusiasms.

2 We asked Durium Products, Inc., to make a price on a set of seven such records which would be low enough to be attractive to purchasers. They did.

3 We got portraits of the scientists. We had these portraits reproduced in photogravure process, each on a sheet of beautiful white gravure paper, size 8½" x 9".

4 On the reverse side of each picture we printed a brief biography of the scientist, together with his complete speech as recorded on the record.

5 Then we packed pictures and records in a compact mailing carton and found that they could be sold for $3, postpaid. Seven recordings of seven great scientists with seven photogravure pictures, $3. We invite your order — send $3 to Science Service, Inc., Washington, D. C. and ask for a set of "GREAT SCIENTIST" RECORDS.

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STUDY NATURE

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ZOOLOGY

Surplus in Oil Will Mean Respite for Persecuted Whale

WHALES, in danger of extermination from overhunting, will "get a break" this year; for due to a heavy over-production of whale-oil last year it has been decided to curtail whaling very sharply, and many ships have been laid up. The present status of the whale problem is discussed in *Science* by Dr. H. C. Townsend, director of the New York Aquarium.

Only Modern Vessels

Dr. Townsend quotes from a letter by a Norwegian correspondent:

"So far as I can gather, the outlook is this: Next season only the modern vessels will go out, and that only provided they have been able to sell the oil in advance. There is still a quantity of say 500,000 barrels unsold of last season's catch . . . Sandefjord, Tonsberg and Larvik are the New Bedford, New London and Nantucket of Norway at the present day."

The whales pursued by the ships of the present day, with their terrifically efficient methods of killing and their factory-like organization, are not the same species whose blubber filled the barrels of the Yankee ships of a century ago. The species chiefly pursued in Antarctic waters, Dr. Townsend says, are blue whale and finback, which did not figure in the catch of the old time whaler. His methods were less effective. Other kinds of whales, such as sperm, right, humpback and sei, are no longer abundant. These were greatly reduced in numbers during the nineteenth century. The gray whale has become a rarity and the once important bowhead does not figure in modern whaling at all.

There is a year's supply of whale oil on hand. Whaling ventures as a whole are in abeyance until next fall. It is evident that the stock of whales has greatly decreased. It would be deplorable if the last season's slaughter were repeated in 1933, and the world's most important animal-oil resource seriously damaged.

Science News Letter, March 19, 1932

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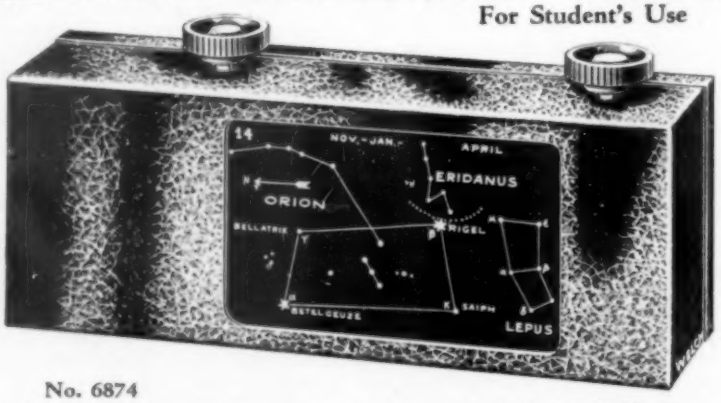

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ZOOLOGY

Moose Calf Approved Radio But Disliked Announcer

RADIO ANNOUNCERS seem to be as much anathema to Yellowstone Park moose as they are to some people. Park Ranger Edward E. Ogston tells this tale of a moose calf he saw lying within range of his loudspeaker when he turned on his radio:

"Music drifted to the calf and he turned his head from side to side like a smart dog listening to his master's voice. The calf was pleased and contented until, as Walter Winchell would say, 'Now we'll let the dunce play his three notes,—ding—dong—ding.' Following the station announcement, a masculine voice spoke from the radio. In an instant the calf was on his feet. With hair bristling he ran into the woods with a very discontented air, quite different from the calm peaceful attitude of his repose."

Science News Letter, March 19, 1932

ORNITHOLOGY

Nature Ramblings

By FRANK THONE

A Well-Groomed Minstrel

THE RED-WINGED blackbird is a handsome fellow and a stylish; he has caught the trick of cutting a dash with a somber costume relieved by a spot of bold color. His whole plumage is as black as the gown of the austerest of priests, and his yellow-edged red epaulettes are as eye-catching as those of the gaudiest hussar. That is only his warm-weather coat, however; in his winter resorts he is a mottled, nondescript bird you wouldn't recognize at all. Also, his mate wears an unpretentious mottled brown-and-gray garb the year around; you might take her for a thrush.

The red-wing is one of the most melodious of our spring singers; there is an appealing flute-like quality in his note that almost everyone likes. When he sings, he keeps up a constant heaving fluttering with his wings, as though the task cost him a good deal of effort. But he does not spare the labor, for he seems to like the sound of his own voice, and when he isn't singing he is chattering volubly.

He seems to have an especial liking for one kind of orchard pest, the cankerworm. It has been asserted that he will fly at least half a mile, passing over other good hunting spots, to get a supply of these worms from an afflicted orchard and carry them back to his nest for his fledglings.

To a certain extent, however, the red-wing shares the unpopularity that falls to the lot of his cousins, the grackles, because like them he is a social bird, travelling in flocks, and sometimes damaging grain fields. But his flocks are smaller, and so is his individual appetite, so that for the most part there is no complaint against him.

Science News Letter, March 19, 1932

ENGINEERING

Glass Replaced by Steel In World's Largest Radio Tube

THE LARGEST radio tube in the world, an apparatus of iron and steel weighing hundreds of pounds instead of the usual light-weight glass bulb, has been built in the laboratories of the Metropolitan-Vickers Company at Manchester, England, to replace 50 high-power tubes of a large radio station.

The new apparatus stands ten feet high and is 14 inches in diameter. Its input is 500 kilowatts.

The largest radio tube in America has an output of 200 kilowatts, which means that its input is about 300 kilowatts. It is made chiefly of glass and its vacuum is permanently sealed like that of a common electric lamp bulb. The British tube, however, is not permanently sealed. It is necessary to keep its pressure low by the occasional operation of an oil vacuum pump.

Engineers of the Metropolitan-Vickers Company see in the new tube a number of advantages over the older type. The vacuum will not become less as the tube ages, the difficult process of sealing off electrodes under vacuum has been avoided, and the tube has been built so that it can be readily torn down for repairs and reassembled, they claim. On the other hand, American radio operators are seeking greater distance by the use of short waves rather than great power, engineers in this country point out.

A discovery three years ago, during research which did not at all concern radio, makes possible the new vacuum tube. At that time scientists produced an oil which can be boiled at a fairly high temperature without decomposition and which has a rate of evaporation so low that at room temperature it can be put inside a radio tube without impairing the vacuum. This oil, used to replace mercury in the vapor vacuum pump, has taken the continuously evacuated tube from the hands of the physicist and placed it at the service of the engineer.

Science News Letter, March 19, 1932

SCIENCE on the RADIO

Science Service Presents Over the Radio, an Address

THE CONQUEST OF DIPHTHERIA

By Dr. A. W. Freeman of the School of Hygiene and Public Health Johns Hopkins University

Friday, March 25, at 3:45 P. M., Eastern Standard Time

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General Science

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Entomology

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Science News Letter, March 19, 1932

Acoustics

PLANNING FOR GOOD ACOUSTICS—Hope Bagenal and Alex. Wood—*Dutton,* 413 p., $6.75. The deepening penetration of science and its applications into the lives of people now brings forward a book that tells what we have learned about making buildings of all kinds, from the small homes to huge auditoriums, pleasing places in which to speak and be spoken to. A mass of material is presented that even those who are only slightly concerned with the subject will find keenly interesting.

Science News Letter, March 19, 1932

Agriculture

ELECTRICITY ON THE FARM—*Committee on the Relation of Electricity to Agriculture,* 332 p., $1. More than one hundred uses of electricity on the farm are described in detail from the best available information obtained largely through federal and state engineering, agricultural and extension bulletins. The usefulness of the book is increased by its 570 illustrations, 87 charts and 160 tables. It is an extensive revision of a 1928 edition.

Science News Letter, March 19, 1932

Physical Chemistry

MOLECULAR RAYS—Ronald G. J. Fraser—*Macmillan,* 204 p., $3.75. This monograph is one of the Cambridge Series of Physical Chemistry edited by Prof. E. K. Rideal. The technique of the use of the molecular beams, developed chiefly at the hands of Stern and his collaborators at the University of Hamburg, has had many striking applications in recent years. For this reason it is attracting more and more attention from wide-awake investigators as a novel method of approach to both physical and chemical problems. It is finding application in the following fields: gas kinetics, reactions of gas molecules with solid surfaces, diffraction of molecules, investigation of the magnetic and electric properties of molecules (as in the Stern-Gerlach experiment) and in the study of chemical equilibria. The book is excellently organized and beautifully printed.

Science News Letter, March 19, 1932

Philosophy

PARADOXY: THE DESTINY OF MODERN THOUGHT—Richard Rothschild—*R. R. Smith.* 256 p., $3. Mr. Rothschild rebels against the dominance of physical science in present-day thought, and endeavors to bring back some of the non-scientific heritage of the race.

Science News Letter, March 19, 1932

Geology

THE GRAND COULEE—J. Harlen Bretz—*American Geographical Society.* 89 p., $4. Out in the Pacific Northwest there is an enormous dry gorge, the Grand Coulee. Over its sides, in times past, there thundered a series of vast waterfalls that would have made Victoria Nyanza itself seem puny. In this monograph Prof. Bretz gives the place its first adequate geological description, supplemented by an excellent map and a series of fine aerial photographs.

Science News Letter, March 19, 1932

Zoology

SHELLED INVERTEBRATES OF THE PAST AND PRESENT—R. S. Bassler, C. E. Resser, W. L. Schmitt and Paul Bartsch—*Smithsonian Institution Series.* 365 p. The zoology and paleontology of crustaceans and mollusks, with a few other fossil forms, is here given excellently balanced treatment. The four authors all have a happy gift for reconciling the requirements of scientific exposition with the understanding and interest of a non-technical audience.

Science News Letter, March 19, 1932

Botany

THE CACTUS AND ITS HOME—Forrest Shreve—*Williams and Wilkins.* 195 p., $3. Dr. Shreve is peculiarly well equipped for his task of promoting popular understanding of a group of plants in which popular interest is already spontaneously well developed, for he has spent his active scientific life in the Southwest, where cacti are most highly played. He tells what cacti are, how they conduct their life affairs, why their genera and species have the names they have, and finally, how cacti can be cultivated with success and satisfaction.

Science News Letter, March 19, 1932

Ornithology

THE BIRDS OF ST. LAWRENCE ISLAND, BERING SEA—Herbert Friedmann—*Smithsonian Institution.* 31 p., 6 pl. St. Lawrence Island was an important stepping-stone for the Asiatic tribes that crossed Bering Strait to found the Indian race in America. The birds brought back by a recent expedition to this half-way house have, therefore, an interest for anthropologists as well as ornithologists and geographers as well as ornithologists.

Science News Letter, March 19, 1932

Industrial Hygiene

INDUSTRIAL HYGIENE FOR ENGINEERS AND MANAGERS—Carey P. McCord, assisted by Floyd P. Allen—*Harper,* 336 p., $5. The book is very comprehensive, covering among others such subjects as first aid in industry, factory sanitation, foods for industrial workers, mutual benefit association, accident prevention and industrial hazards. Its practical nature will make it especially useful and satisfactory.

Science News Letter, March 19, 1932

Teaching

THE INTRODUCTORY BIOLOGICAL SCIENCES IN THE TRADITIONAL LIBERAL ARTS COLLEGE—G. E. Nelson—*Teachers College, Columbia University.* 135 p., $1.50. A study of curriculum content and teaching methods in elementary courses in biology.

Science News Letter, March 19, 1932

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